

## Legal and Ethical Aspects of Cloning and De-Extinction – A Short Review

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### ABSTRACT

The discovery and deciphering of the human and animal genomes opened completely new fields in the domain of science. Opportunities for advancement in all fields have become almost limitless. In the last 50 years, science has progressed more and better than in the last millennium. This progress has led us to a number of questions of primary moral and then legal character. Should we slow down or limit progress? Have we crossed the lines we shouldn't have crossed? Should we completely free science from all moral and legal rules and stick to the principle of laissez faire, that is, let everything take its course? One of the most controversial issues that has arisen in recent decades is the question of the ethics of cloning, i.e. the artificial reproduction of living organisms – humans and animals. Almost all relevant factors tried to answer this question. Thus, some believe that cloning should be used both for therapeutic and reproductive purposes, while others go a step further and mention the economic exploitation of clonal organisms. Others believe that we have opened Pandora's box and that we are playing God, and are strongly opposed to cloning as a procedure, regardless of the goal and purpose. The main goal of the text before you is the author's attempt to make his modest contribution to this discussion.

**Keywords:** cloning, de-extinction, ethics, law, genetic engineering, morality, respect for life

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“Life will always find a way.”

Jeff Goldblum in 'Jurassic Park' (1993)

### Introduction

The possibility of artificial multiplication of living organisms was the subject of speculation and the subject of many discussions during the 20th century. But the history of cloning goes back much longer. It is believed that the first gene manipulations were carried out by humans more than 2000 years ago (using methods such as grafting or stem cutting, but here we must wonder if people were then aware of the manipulation of nature they were doing). The modern era of cloning begins in 1958 with the first artificial multiplication of carrots. Namely, that year F. C. Steward cloned carrot plants from mature single cells placed in nutrient culture containing hormones. A few years later, the first animal was cloned – a frog (xenopus). The scientists did this by taking the nuclei of intestinal cells and injecting them into unfertilized eggs whose nuclei of the original parents had been destroyed using UV light. About 20 years later (in 1983), J. McGrath and D. Solter successfully cloned the first mammal – a mouse, by introducing the pronucleus of one zygote into another enucleated zygote (admittedly, the first failed attempt to clone mammals was performed by D. Bromhall in 1975 by transplanting the nucleus into a guinea pig oocyte). Soon after, progress in

biotechnology erupted, which led to the successful cloning of the famous Dolly the Sheep in 1996 (by the technique of somatic cell nuclear transplantation) [1]. Since then, many different types of life have been successfully cloned – cows, dogs, coyotes, wolves, cats, camels, rats... All this tells what the possibilities of science are and what is its beauty. However, certain authors believe that this is precisely the dark side of science and that this is a path that we do not know where it will lead us. Will it be self-destruction or something else? Did science do the right thing when it entered the field of bioengineering? Is what is being done ethical? The author hopes to find answers to these and many other questions in the following lines.

### **Cloning – A Step Forward in Science or Two Steps Back In Morality?**

Cloning a human (or human being) is a process in which the entire DNA of one human is introduced into an egg cell to obtain an embryo with an identical DNA code. The resulting embryo is almost the same as any other. The only difference between an embryo created in this way and an embryo created through natural reproduction is that it contains the DNA of only one person, not two. Today, he distinguishes between two basic types of cloning: (i) reproductive cloning and (ii) therapeutic cloning. In the first case, cloning serves as a substitute for the natural reproductive process. The resulting child has only one parent with whom it shares DNA and/or a surrogate mother (depending on whether the DNA donor also carries an embryo). The purpose of reproductive cloning is to create a new individual, in this case a new human. In therapeutic cloning, the situation is much different. A new human being is not developed from the resulting embryo, but its stem cells are extracted and used to treat the DNA donor [2]. Proponents of reproductive cloning argue that it must be allowed as part of the procreative rights of couples who cannot otherwise have children or people with hereditary diseases for whom sexual reproduction poses a risk. According to this understanding, reproductive rights include the right to procreation through cloning when this is the only possibility of obtaining offspring. If the state wants to limit that right, then it must state the reasons for such a decision. In addition, proponents of reproductive cloning maintain that its ban violates the right to scientific research, which is guaranteed in the constitutional provisions of most states. However, even this right is not unlimited [1, 3]. Opponents of reproductive cloning most often cite as their argument the violation of the principle of equality of human beings. Namely, this argument expresses the fear that clones will be treated as „assets“, and that they will thus become second-class beings. In principle, it is a moral and political question: Should clones be given the status of a natural born human with all the associated packages of rights and treated equally or treated as an industrial product? A further argument against reproductive cloning is the claim that cloning destroys a person's personal identity. This argument is based on the claim that every individual has the right to their genetic identity, and cloning violates that right because a clone is a copy of the person who donated the nucleus [1, 4-5]. Here then we must ask ourselves, from the point of view of the DNA donor: Is the clone me or is it just like me? Is it the original or is it a copy of the original? If it is an original, then it must mean that it also has the characteristics of the original: habits, emotions, memories, values, beliefs... It would be real so that the consciousness of the original is cloned along with the body. So, it is still a copy of the original that presents itself as an individual and independent organism with its own consciousness and its own thinking. That copy can start to develop in a completely different direction and take on characteristics opposite to those of the original. In short, the DNA donor (the original) is only one, and each clone created from his DNA is his independent copy. In principle, there is an original, but there is also a clone. The clone was created from the original, because if it wasn't for him (the original) there wouldn't be a clone either (the theory of originality or genuine theory). After this discussion, if we return to the posed dilemma, we can conclude that this can violate the personal identity of the DNA donor, but only if it is a completely identical clone, i.e., a clone that, in addition to the body, shares the consciousness with the original. Furthermore, the argument that reproductive cloning violates human dignity is closely related to the idea of human instrumentalization. This argument is acceptable, but only in cases where we would use the clones as assets, for example as a reservoir of spare parts for ourselves [2, 6-7]. This question of ours leads to another type of cloning, which is cloning for therapeutic purposes. The main argument pro therapeutic cloning is that it can result in the elimination of many diseases and the solution of many other health problems. Namely, since there are organs in the human body that cannot be

regenerated at all (or regeneration requires a long period of time), it is considered justified to use stem cells created by cloning. These are, in principle, undifferentiated cells that can differentiate to become, for example, nerve cells [8]. Thus, therapeutic cloning could lead to the creation of a completely new industry – the industry of human tissues and organs. However, then certain moral dilemmas arise.

In bioethics, cloning ethics considers many ethical positions regarding the practice and possibilities of cloning, especially human cloning. Although most of these attitudes are of religious origin, the authors also deal with questions from a secular perspective. Human therapeutic and reproductive cloning is not used commercially (at least not yet). However, there are proponents who support the development of therapeutic cloning to create whole tissues and organs to treat patients who cannot receive tissue or organs from a living donor or to avoid immunosuppressive therapy. Some are concerned about the possibility of using therapeutic cloning to prevent the effects of aging (for cosmetic purposes).

Considering the chronic shortage of organs for transplantation all over the world and the appearance of criminal acts that are the result of the high demand for organs, the possibility of cloning, for example kidneys or liver, gives great hope to those waiting for their turn for transplantation. In addition, the application of the therapeutic cloning technique would largely solve the problem of organ rejection during transplantation. It is clear from all the above that the technique of therapeutic cloning represents a potentially very effective tool in improving medicine [1]. So, if we look at a simple economic calculation – the criminal market of human and human organ trafficking would be reduced and those whose lives depend on organ or tissue transplantation would be saved (the possibility of rejection of the organ would be very small, if the organ or tissue is cloned, because it is the same DNA). Doesn't that look like a win-win situation? Maybe not after all. In order to get the tissues or organs needed by the patient, we have to clone the whole human being, keep him in a vegetative state and harvest tissues or organs as needed. This most controversial issue in the bioethics of cloning would not be a problem if it were possible to artificially create a tissue or organ on an artificial basis, rather than the whole body.

A new question arises here: Do clones have rights? In response to that question, we must consider the question: What exactly is a clone? Is he a human being? Or is he the thing? To obtain a clone at all, it is necessary to apply one of the cloning methods: SCNT (somatic cell nuclear transplantation) or iPSCs (induced pluripotent stem cells). Whatever we apply, we will get an embryo that later develops into an organism [9]. So, it is unquestionable that we need to grow the whole body to get functional organs. If it is an independent individual organism, we must ask ourselves if it is moral to treat another being in such a way that we use his body for harvesting as needed. But what is that being? There are many different understandings of the concept and content of this term, but in principle by being we mean a complete (healthy or with defects) organism that has virtues and defects (sociological-cultural point of view) or a God-realized (spiritualized) organism (philosophical point of view). If it is a subject that develops from an embryo into a fully functional organism (but which does not have two, but carries one genetic material), then it is logical to conclude that it is a living being that will probably (and certainly if it is a human clone) to have awareness and know how to express oneself in some way. This leads to the conclusion that the clone is a being, only its origin is a little, different. Furthermore, we arrive at the fact that a clone as a self-aware being with the ability to express its peculiarities is not a thing. However, maybe we still want to adhere to the legal maxim that, although clones are not things - but the same applies to them as to things? Then it is an industrial material that has only one purpose - to be liquidated to exploit its organs or tissues. What then is the meaning of creating that life? Is it just playing the gods? Perhaps this moral dilemma should be resolved in such a way as to make it immediately clear to the creep that he serves a purpose – to be sacrificed for the salvation of another human being. In this sense, it is a universal ethical principle – self-sacrifice for another. But what if the clone refuses?

The fact is that cloning causes many moral as well as legal dilemmas (which we will see later). Every time we try to find an answer to one question, another arises. Thus, this discussion falls into

a kind of vicious circle. However, work on cloning techniques has advanced our basic understanding in humans. Observing human pluripotent stem cells grown in culture provides great insight into the development of the human embryo, which cannot otherwise be seen. Scientists can now better define the steps of early human development. Studying signal transduction together with genetic manipulation within the early human embryo has the potential to provide answers to many developmental diseases and defects. Many human-specific signalling pathways have been discovered by studying human embryonic stem cells. The study of developmental pathways in humans has given developmental biologists more evidence for the hypothesis that developmental pathways are conserved across species. Cloning gives us answers to new questions and with the help of biomedicine we question the world around us. This tells us that nothing is absolute. Maybe the purpose of cloning is exactly that - to enable us to find an answer to the meaning of life? And what is life anyway?

### **De-Extinction – One Question More?**

The procedure and the issue arising from cloning is the issue of de-extinction, that is, resurrective biology. Namely, it is a process of recreation of extinct organisms (plants or animals). The most suitable method for performing this procedure is, in addition to backward selection, certainly cloning [10-11]. Although it has many advantages, resurrective biology entails many technological and ethical issues.

The de-extinction procedure is, in our humble opinion, a procedure of great importance for bio-conservation. With it, we can save tens of thousands of animal species that die out every day, and even bring back long-lost species (like the mammoth or the sabre-toothed tiger). The technology that would allow us to do this is under development and we believe that within a few years the process of completely returning extinct species to life will become our reality. Let's consider how important it would be for our understanding of life on earth in general. Let's imagine ourselves in a situation where we can observe a giant sloth in its natural environment or once again admire the not-so-long-lost dodo bird. However, what are the moral complications that can arise? Is resurrection biology ethical? In short, the answer to this question can be viewed from the aspect of the goals and purposes of this procedure. For example, the dodo bird was killed en masse for its delicious meat, and the reason for the extinction of this species is precisely man. So, what would be the goal and purpose of returning the dodo bird to life? If it is for study and observation in the natural habitat – then it could be moral and even the right thing to do. However, if dodo birds were to be brought back to life through resurgent biology only to economically exploit them for their tasty meat – then the technology that would be used for this purpose should be at least limited or even completely prohibited. So, if we bring a particular animal species back (e.g. the Tasmanian tiger or the aurochs or the dodo bird) and put it in the same position it was in at the time of extinction – then naturalist scientists are no better than the people who caused those species to disappear.

In addition, there are many other ethical dilemmas to which we still do not have an answer - should the extinctions have happened or are we allowed to play with nature in such a way? Many authors believe that human intervention in certain natural processes, such as extinction, can entail serious consequences. In addition, the fresh de-extinct animal would be a purely human creation and would be the result of purely human interference. Of course, there are pros and cons to everything in science. Thus, the advantages of resurgent biology are stated: (i) recreational value (this is often considered a central motivation for de-extinction), (ii) advancement of scientific knowledge (de-extinction could offer unique opportunities for studying the life history and biology of ancient revived species), (iii) technological advancement (advances in genetic engineering), (iv) environmental benefits (the massive loss of species causes the destruction of the natural systems that purify the world's air and water and any contribution of de-extinction to such processes could theoretically have very high-dollar value, such contribution would also happen indirectly, through usage of de-extinction methods in bio-conservation) and (v) educational and cultural values (the environmental education associated with de-extinction could boost the other utilities, notably, environmental protection and funding for environmental causes). As arguments against this procedure, the authors point out: (i) unwise expenditure (de-extinction may prove a bad

investment, as the chances that resurrected species will not last are realistic), (ii) health concerns (newly de-extinct creatures might prove excellent vectors for pathogens, an extinct animal's genome could also conceivably harbour unrecognized, harmful endogenous retroviruses), (iii) environmental hazard (if the ecosystem that formed the habitat of the extinct species has changed significantly, the reintroduced species may prove to have become a pest) and (iv) harm to animals (utilitarianism that views all sentient beings as moral patients, must calculate animal suffering) [12-21].

It is our humble opinion that we still need to continue working on the development of the technology necessary for the resurrective biology procedure. Also, we believe that bringing extinct species back to life under strictly controlled conditions and in a strictly controlled and limited area would not entail serious consequences - either ethical, practical or environmental (or at least it shouldn't), and yet would have great significance for the development of science and our understanding of the world around us.

### **Legal Regulation and Problems**

The international community - aware of the fact that science has entered legally unregulated spheres, has started preparing and adopting international legal frameworks. The first international instrument that regulates the issue of (reproductive) cloning and explicitly prohibits it is the Declaration on the Human Genome and Human Rights adopted in 1997 within the framework of UNESCO. In the declaration, reproductive cloning is condemned as a practice against human dignity [1]. However, since the declaration is not a legally binding document, at the initiative of some countries, the UN General Assembly formed an ad hoc committee a few years later (2004) whose task is to prepare a document that will be binding for all member states of this universal international organization. But, as is often the case, the states did not manage to reach a consensus on all issues. Namely, agreement was reached on the complete prohibition of reproductive cloning, but therapeutic cloning remained an open question. Some countries believed that all forms of human cloning should be banned (some proposals, e.g., Costa Rica, went so far as to make cloning a criminal offense), while others emphasized the potential advantages of therapeutic cloning. Thus, for example, Spain proposed to ban both types of cloning because, according to their delegation, they are inextricably linked. On the other hand, one of the alternative proposals was to include in the final document a ban on therapeutic cloning for a period of five years from the adoption of the convention and to give the states the possibility of placing reservations on these provisions. Despite the efforts and negotiations that lasted four years with interruptions and even though all countries agreed on the prohibition of reproductive cloning, the convention was not adopted. Disagreements and disagreements regarding the legal regulation of therapeutic cloning were too great and eventually prevented the adoption of a convention. Finally, in 2004, a Working Group was established with the task of drafting a declaration on cloning, and in March 2005, the Declaration on Human Cloning was adopted, which calls for the prohibition of all forms of human cloning insofar as it is incompatible with human dignity and the protection of human life. Adoption of this Declaration does not represent a significant step in terms of legal regulation of cloning. As previously stated, the declaration by its legal nature does not necessarily represent a legal document, so this declaration has only symbolic significance [1].

What did not succeed at the international universal level succeeded at the regional, or rather – European level. One of the most important intergovernmental organizations - the Council of Europe - adopted two important documents: (i) the Convention on the Protection of Human Rights and the Dignity of the Human Being in the Application of Biology and Medicine: Convention on Human Rights and Biomedicine and (ii) the Additional Protocol on the Prohibition of Human Cloning beings. Legal theory was divided over whether the Convention itself really prohibits human cloning. Namely, in Article 1 of the Convention, the contracting states undertake to protect the dignity and identity of all human beings, which leaves room for numerous machinations. Therefore, it was necessary to adopt the Additional Protocol, which explicitly prohibits the cloning of human beings (the provisions of Article 1 of the Additional Protocol prohibit any procedure intended to create a human being genetically identical to another human being, whether living or dead).

Regarding the cloning of human beings, the state's policy varies, but all the positions expressed so far advocate the prohibition of (reproductive) cloning, while there are serious doubts about therapeutic cloning. Today, there is not a single country that has legalized reproductive cloning, and an increasing number are passing laws prohibiting the creation of identical human beings using the cloning technique (some states have even criminalized the cloning of human beings with serious criminal sanctions). So, for example, if you clone a human being in Germany, you can face a fine or a prison sentence of up to five years, while if you do the same in Italy, you will face a prison sentence between 10 and 20 years and a fine between 600,000 and 1,000,000 euros. Only a few countries have enacted legislation regulating therapeutic cloning, either explicitly prohibiting it (e.g. Germany, France) or allowing it (e.g. Japan, Belgium, Sweden, the United Kingdom, Israel and others). On the other hand, a large number of countries have not legally regulated this issue [1].

The legal issue continues with the disappearance procedure. The first question that arises is: Will the revived species be, legally speaking, an „endangered species“? The answer to this question is unclear. Legal regulations regarding the requirements that a species must „fulfill“ in order to be endangered are different, but, in principle, the following criteria are valued: (i) has a large percentage of the species' vital habitat been degraded or destroyed, (ii) has the species been over-consumed by commercial, recreational, scientific or educational uses, (iii), is the species threatened by disease or predation, (iv) do current regulations or legislation inadequately protect the species and (v) are there other people-made factors threatening the long-term survival of the species. According to Sherkow and Grelly all considerations that would seem to apply to a newly revived species and, ironically, international organizations typically tie endangered status to whether species' population has declined – the opposite of the concern about newly revived species. Uncertainty about the status of de-extinct species will affect numerous civil, criminal, and international laws [14]. Another question that arises is: Is it possible to patent revived species? At this moment the answer is - no (?). patenting of new animal breeds, as well as essentially biological procedures for obtaining new animal breeds, are exempt from patent protection. However, this all refers to „new“ species, and strictly speaking the Tasmanian tiger or the woolly mammoth are not exactly „new“ animal species. This brings us to the third question: Will this area be legally regulated and, if so, how? Again, the answer here is quite unclear. As it is a not very insignificant sphere of life, leaving it legally unregulated would be disastrous. The ways and mechanisms by which this can be done are different: adoption of international conventions (universal or regional), adoption of regulations at the national level with coordination and consultation with the scientific community, adoption of inter-university or inter-scientific (non-binding) declarations or guidelines in the form of opinions of the experts... So, the mechanisms are different, but since this is not a discussion whose goal is to find a *de lege ferenda* solution, we will stop here.

### Conclusions

There are certainly legal and ethical reasons against cloning, and we cannot say that they are not well-founded. The consequences of cloning can be disastrous from a moral point of view. Is it really our intention to put human clones in the position of prisoners in Nazi concentration camps or bring extinct animals back to life just to exploit them economically? If so, then I have to give up on further research and direct those resources to something much more humane. But if that is not our intention – we need to roll up our sleeves and fill the boilers of progress with the highest quality coal and boldly move into the future. The need for medical progress is slowly overriding moral and ethical principles, so society and law are adapting to it. It is our opinion that one should not hold back in the pursuit of constant progress. This is precisely why science is so wonderful. She tells us that nothing is absolute and that we should constantly question the world around us. After all, it's in our human nature. Also, we believe that we should tread with caution on certain paths of science. This is the only way we can avoid certain negative consequences that may occur. Whenever possible, it is necessary to avoid causing excessive suffering to all living beings, but we should not adhere to this at all costs. Cloning and de-extinction should definitely be subject to appropriate legal regulations and these two processes should be kept under constant supervision.

But these restrictions must not be greater than necessary. They should be such as to avoid negative consequences, but not such measures as to hinder any kind of progress in science.

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